

AC NO: 91-13C

DATE: 7/24/79



ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION

SUBJECT: COLD WEATHER OPERATION OF AIRCRAFT

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1. PURPOSE. This Advisory Circular provides background and guidelines relating to operation of aircraft in the colder climates where wide temperature changes may occur.
 2. CANCELLATION. Advisory Circular 91-13B dated January 17, 1978, is canceled.
 3. DISCUSSION.
 - a. Aircraft and their components are designed to operate within certain temperature ranges. If information concerning these ranges is not readily available, operators are urged to consult the manufacturer as to the precautions to be taken in extremely cold weather operation.
 - b. Experience has shown that the advice of operators and mechanics permanently located in the area of operation is of great value.
 4. PREPARATION OF THE AIRCRAFT FOR COLD WEATHER.
 - a. Insulation Against Heat Loss (Reciprocating Engines). In extremely cold temperatures all oil lines, oil pressure lines, and tanks, if possible, should be inspected for proper insulation to preclude the possibility of oil congealing. The insulation used must be fireproof material and installation should be accomplished by an experienced A and P mechanic.
 - b. Baffling and Winter Covers. Baffles, winter fronts, and oil cooler covers are recommended by some manufacturers. FAA approval is required for installation unless the aircraft manufacturer has provided for their approval.
 - c. Oil and Grease. The viscosity of the oil and grease used is very important in cold weather operation. Use only the grades of oil and grease specified by the manufacturer.
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conditions with retractable gear aircraft. It is recommended that wheel pants be removed from fixed-gear aircraft to prevent the possibility of frozen substance locking the wheels or brakes.

5. OPERATION OF THE AIRCRAFT.

a. Preflight Inspection. A thorough preflight inspection is extra important in temperature extremes. At extremely low temperatures, the urge to hurry the preflight of aircraft and equipment is natural, particularly when the aircraft is outside and adverse weather conditions exist. This is the very time to run the most thorough preflight inspection.

(1) Fuel contamination. Fuel contamination is always a possibility in cold weather. Modern fuel pumping facilities are generally equipped with good filtration equipment and the oil companies attempt to deliver pure fuel to your aircraft. However, even with the best fuel and precautions, if your aircraft is warm when parked with half-empty tanks, cold temperatures will condense water in the tanks.

(2) Fueling facilities. Another hazard in cold climates is the danger of fueling from makeshift fueling facilities. Fuel drums or "case gas," even if refinery sealed, may contain rust and somehow contaminants may find their way into the fuel. Cases are on record of fuel being delivered in unidentified containers which was not aviation fuel. As a precaution, we suggest:

(i) Always use fuel from modern fueling facilities and fill your tanks as soon as possible after landing.

(ii) Be sure the fuel being delivered is the correct grade of aviation fuel for your engine.

(iii) If a fuel source other than (i) is used, be sure to filter the fuel as it goes into your tanks. Note: A funnel with a chamois skin is not a filter. Once saturated, a chamois will not remove water. There are many good commercial filters available.

(iv) Special precautions and filtering are necessary with kerosene and other gas turbine fuels. Manufacturers can supply full details on handling these fuels.

(3) Aircraft fuel filters and sumps. Fuel filters and sumps (including each tank sump) should be equipped with quick drains. Sufficient fuel should be drawn off into a transparent container to see if the fuel is free of contaminants. Drain all of the fuel sumps on the aircraft, including individual tank sumps. Extra care should be taken during changes in temperature, particularly when it nears the freezing level. Ice in the tanks may turn to water as the temperature rises, and pass through the filter into the carburetor or fuel controller causing the engine to stop. During freeze-up in the fall, water can freeze in lines and filters--causing stoppage and fuel leaks.

(iv) Engines may quit during prolonged idling because sufficient heat is not produced to keep the plugs from fouling out. Engines which quit under these circumstances are frequently found to have iced-over plugs. Prolonged idling should be avoided.

(v) Turbine engines can accumulate internal ice overnight and resist rotation when starting is attempted. With any indication of locked rotor, unusual noise or low RPM, discontinue the start. The procedure here is fundamental. Always be aware that the rotors could freeze on any cold weather start and be alert enough to discontinue the start before damaging the engine. When weather forecasts include snow, ice, or sleet, engine cowl plugs for jet engine outlet openings should be installed if aircraft is to be exposed to the elements.

(6) Removal of frost, ice, and snow. All frost, ice, and snow should * be removed from all airfoil and control surfaces, and around the static system sensing port. Alcohol or one of the ice removal compounds can be used or it * can be melted off in a heated hangar. If it is melted off, be sure the water doesn't run into control surface hinges or crevices, and freezes when the aircraft is taken outside.

(7) Blowing snow. If an aircraft is parked in an area of blowing snow, special attention should be given to openings in the aircraft where snow can enter, freeze solid, and obstruct operations. These openings should be free of snow and ice before flight. Some of these are:

(i) Pitot tubes and static system sensing ports.

(ii) Wheel wells.

(iii) Heater intakes.

(iv) Carburetor intakes.

(v) Tail wheel area, especially where snow can freeze around elevator and rudder controls.

(vi) Fuel vents.

(8) Ski operation. The ski safety cables and shock cords should be carefully inspected. Pay particular attention to those on the front of the skis. If the front cables or shock cords should break on takeoff, the nose of the ski can fall down to a near vertical position which seriously affects the aerodynamic efficiency of the aircraft and creates a landing hazard.

(9) Fire extinguisher. Fire extinguishers should receive special winter attention. CO₂ bottles should always have the proper charge. Dry powder extinguishers are highly desirable.

e. En Route.

(1) Weather. Weather conditions vary considerably in cold climates. In the more remote sections of the world, weather reporting stations are generally few and far between; therefore, considerable reliance must be made on pilot reports.

(i) Snow showers and white outs. Snow showers are, of course, quite prevalent in colder climates. When flying into a shower, a pilot should be prepared to go on instruments since visual reference may be quickly lost. White out is another hazard which has claimed as its victims some very competent pilots. This is a condition in which there are no contrasting ground features in the pilot's visibility range. Obviously the smaller the visibility range, the more chance there is of a white out. However, a white out can occur in good visibility conditions. A whiteout condition calls for an immediate shift to instrument flight; the pilot should be prepared for this both from the standpoints of training and aircraft equipment. If icing conditions are anticipated or exist, be certain that the anti/deice equipment is put into operation soon enough so it may function in the manner for which it was designed; i.e., anti-ice equipment is to prevent ice formation, not to eliminate ice that has built-up.

(2) Survival gear and clothing.

(i) If the country over which the flight is planned is such that a survival problem would be created in a forced landing, appropriate survival gear should be carried. Survival gear will vary with individual needs, temperature, and routes. There are many fine survival kits on the market. Some fixed-base operators offer these kits for rent. Probably the most important piece of survival gear is the clothing of the aircraft occupants. Survival clothing should be worn as much as possible or kept handy so that if the aircraft is forced down and a fire ensues, the survival clothing will not be lost.

(ii) In the event of an accident in sparsely populated areas, proper operation of your emergency locator transmitter can help the search party locate you.

(3) Skis.

(i) The installation of skis will cut cruising speed to some extent. In addition to some loss of aerodynamic efficiency, skis have other disadvantages. They require more care in operation because bare spots must be avoided to keep from wearing the bottom coating of the skis. The bottom coating must be renewed on some skis periodically. There is an anti-friction tape which is very useful for this purpose. Skis equipped with anti-friction coating do not freeze to the surface as do those with bare metal exposed to the snow. Another method of keeping skis from freezing to the surface is to taxi the aircraft onto poles placed across and under the skis. This prevents contact with the snow or ice for most of the length of the ski.

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h. Post Flight. Here are a few items to consider after the flight:

(1) Fill the tanks with the proper grade of aviation fuel, especially if the aircraft is to be parked in a heated hangar.

(2) If the aircraft is to be left outside, install engine covers and pitot covers.

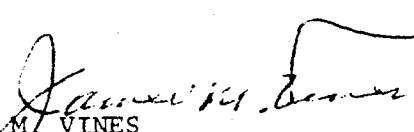
(3) If the weather forecast is for snow or "clear and colder," install wing covers if available.

(4) Control locks or tied controls are suggested if the aircraft is left outside. Tie-downs are, of course, also suggested. Advisory Circular 20-35B, Tie-Down Sense, gives good advice on tie-downs. A copy of AC 20-35B can be obtained by writing to the: U.S. Department of Transportation, Publications Section (M-443.1), Washington, D.C. 20590.

(5) The manufacturer's recommendations should be carefully followed if the engine oil is to be diluted.

(6) During reciprocating engine shutdown, a good practice is to turn off the fuel and run the carburetor dry. This lessens the fire hazard during preheat the next morning.

Note: The information in this advisory circular is not intended to replace, substitute for, or supersede official regulations or the manufacturer's instructions.


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